

Feedback Research: Information Flow in TRANSIMS

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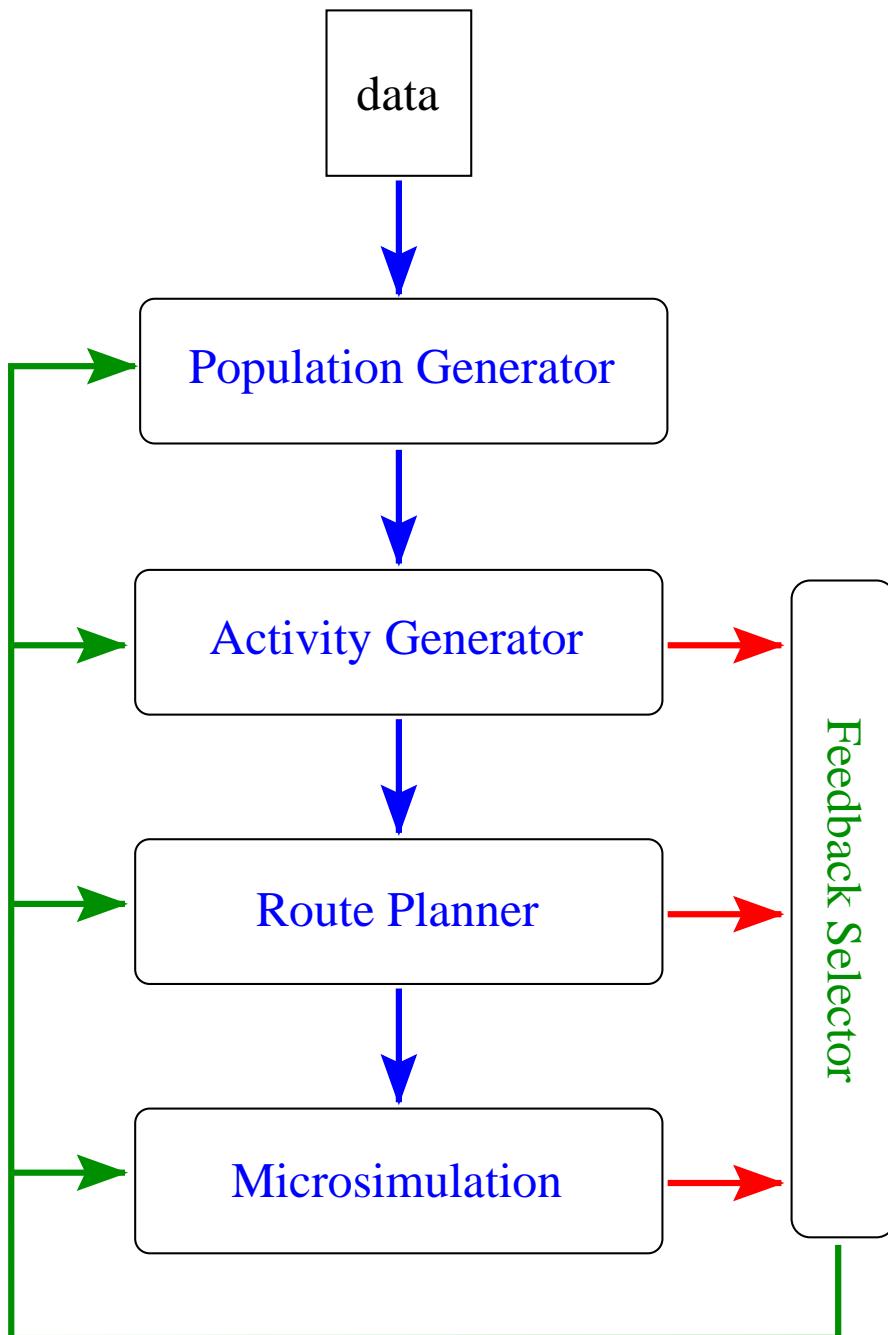
12 January 2000

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Goal

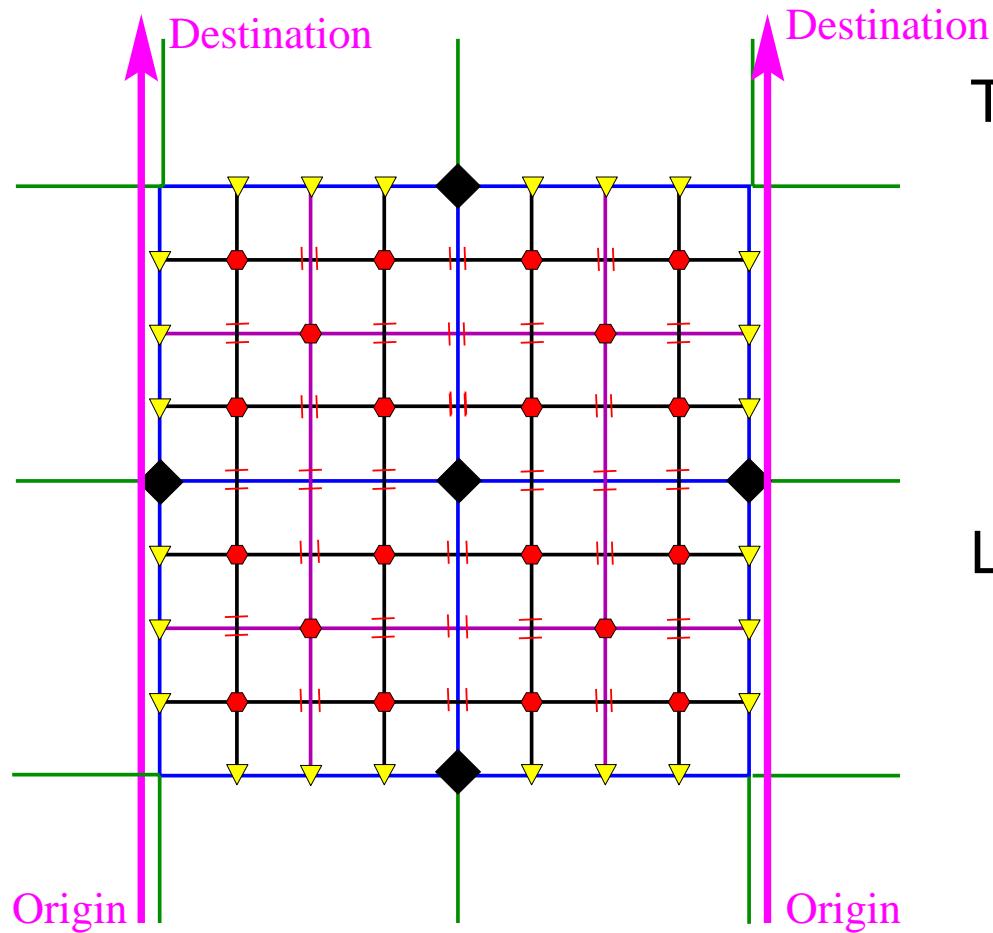
Develop general methods and flexible tools to provide information movement in transport systems modeling using TRANSIMS.

TRANSIMS Information Flow



1. Feedback for Simulation Convergence

Test Network



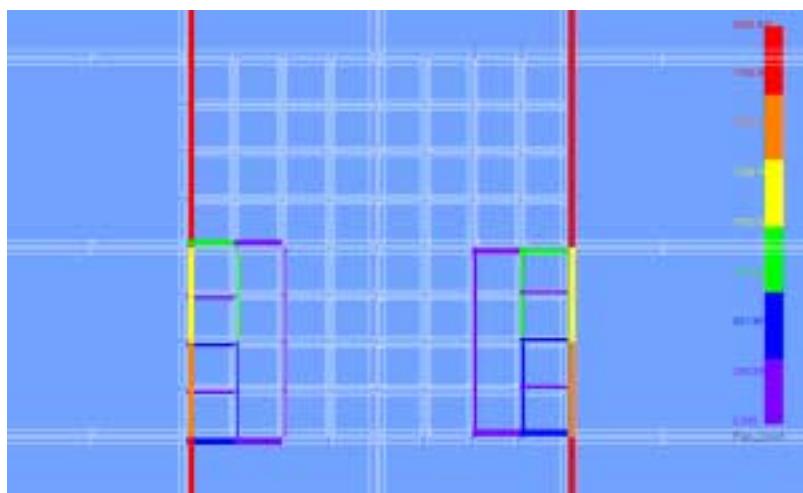
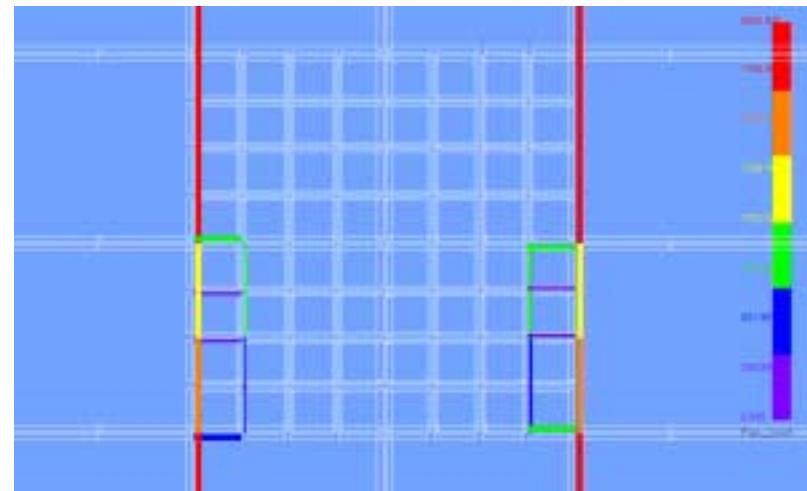
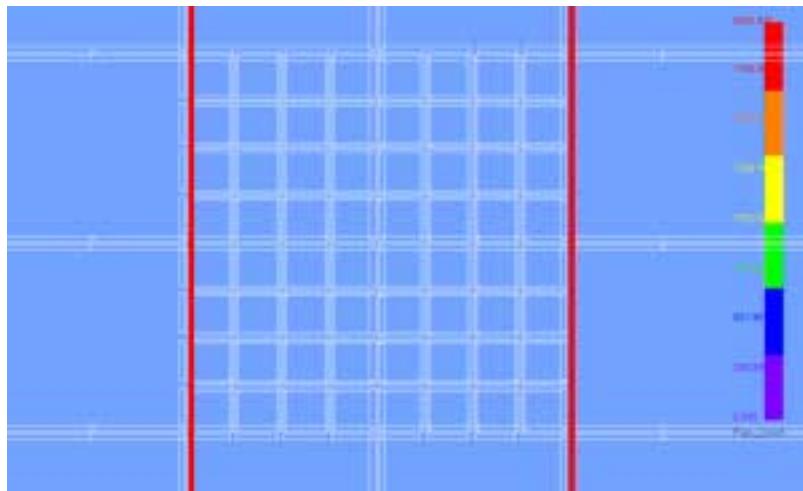
Traffic Controls:

- ◆ Signal
- 4-way Stop
- ▽ Yield
- 2-way Stop

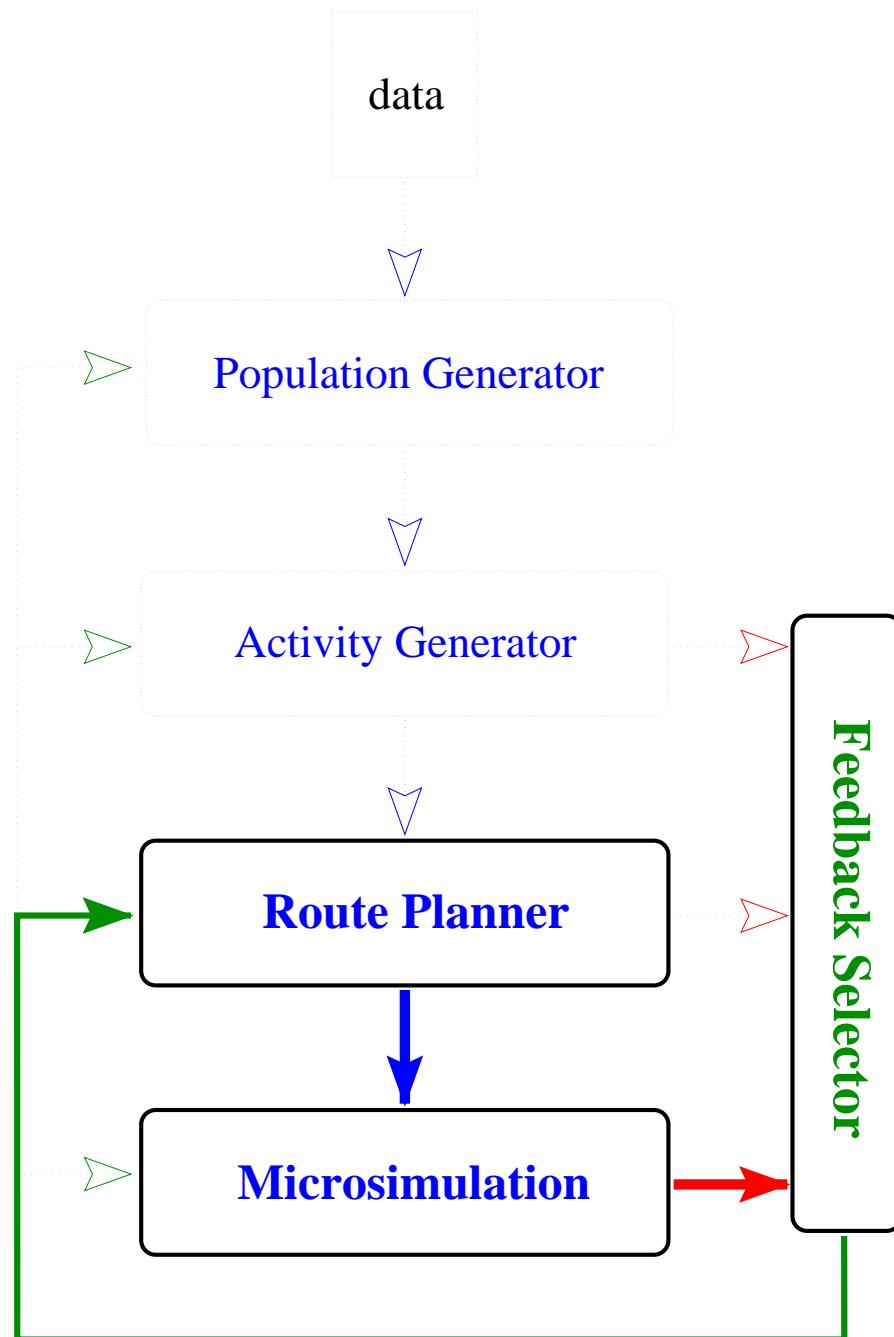
Link Types:

- Pri. Artery
- Sec. Artery
- Collector
- Local

Example of Route Convergence

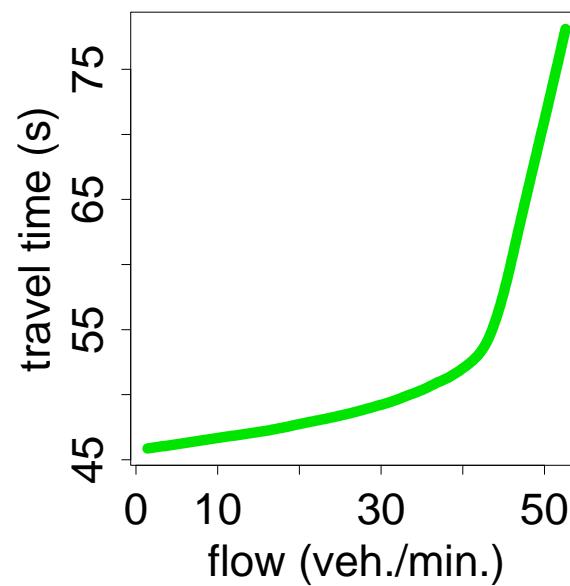
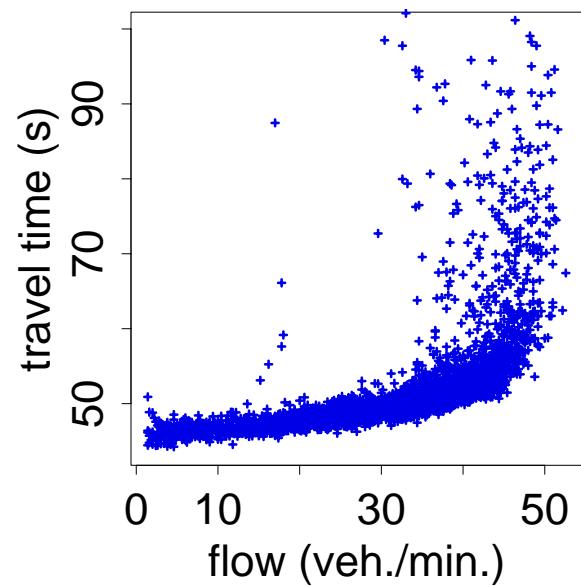


Route Convergence Selector



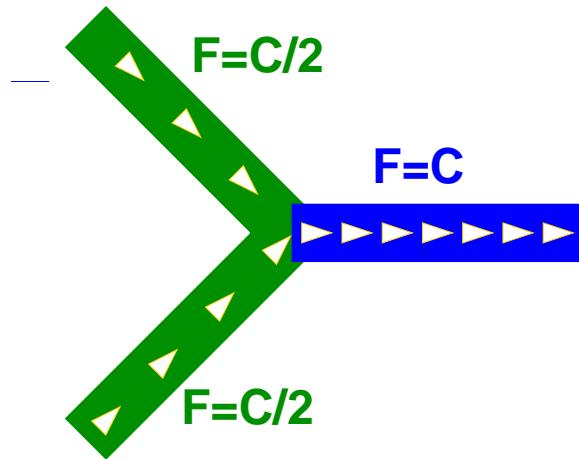
Output is Realistic

Information in TRANSIMS includes the idiosyncrasies of real-world data, but, like real-world data, can be averaged to produce the traditional picture of traffic.

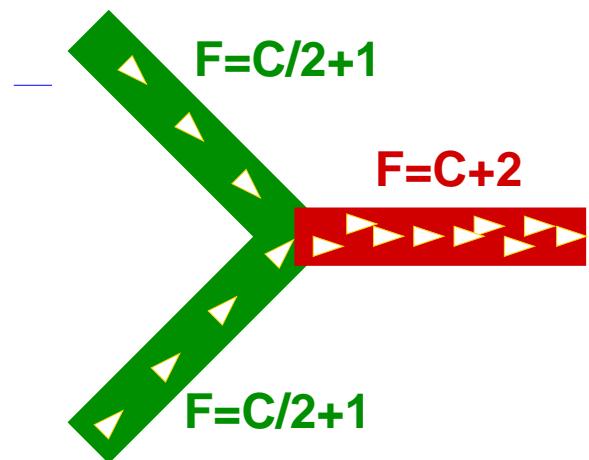


As usual, TRANSIMS matches traffic data when averaged.

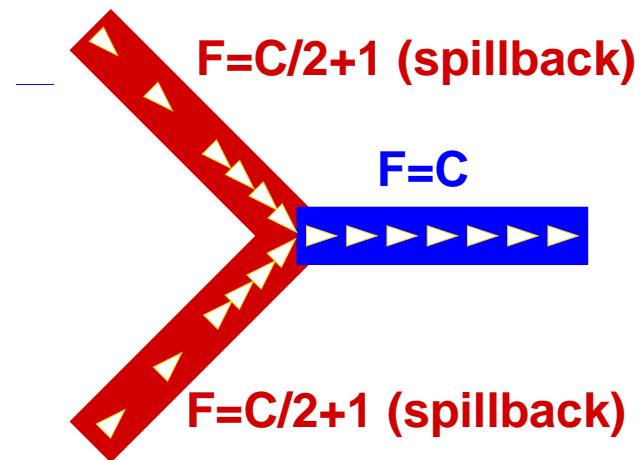
Output is Realistic



without feedback



with feedback



Comparison with Frank-Wolfe Assignment

method-1, iteration 3

time (s)	path 1	path 2	path 3
300	4	154	89
600	4	167	101
900	5	182	83
1200	3	170	90
1500	5	180	79
1800	3	155	99
2100	1	165	94
2400	4	169	94
total	29	1342	729

Nash equilibrium

path 1	path 2	path 3
0	1337.7	762.3

Other Successful Convergence Methods

- Replanning fraction as an explicit function of iteration number
- Constant replanning fraction w.r.t iteration
- Replanning fraction as a function of traveler satisfaction
- Incremental loading
- Delay-table averaging

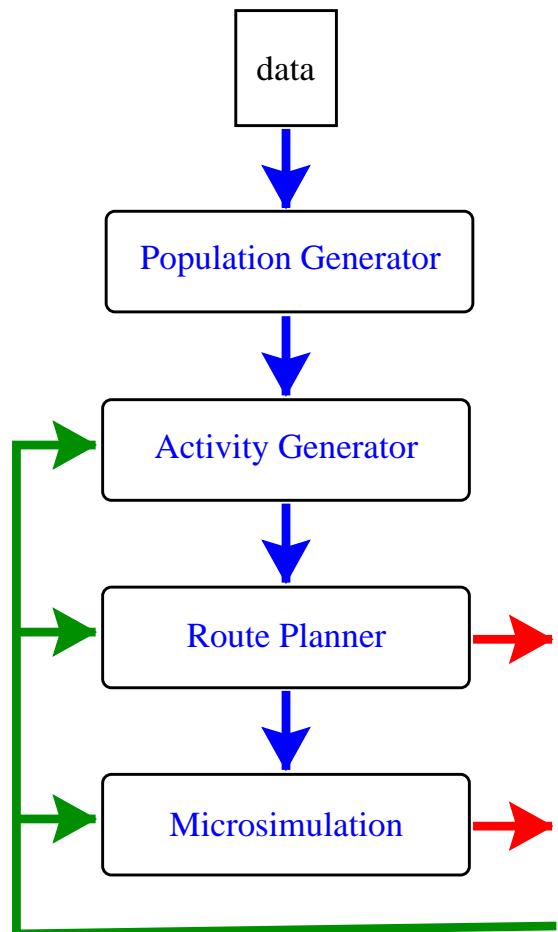
- Inclusion of noise in Router link-times
- Router noise as a function of iteration or traveler satisfaction

2. Feedback for Information Flow Modeling

Example: Traveler Information System

- Explicit modeling of information flows using feedback
 - control quality of information
- Intelligent Transportation Systems (ITS)
- To specific link or specific person
- Same tools. Same framework.

ITS selector



ITS Feedback Selector

From:

spatially aggregated
temporally windowed (present, future)
individuals

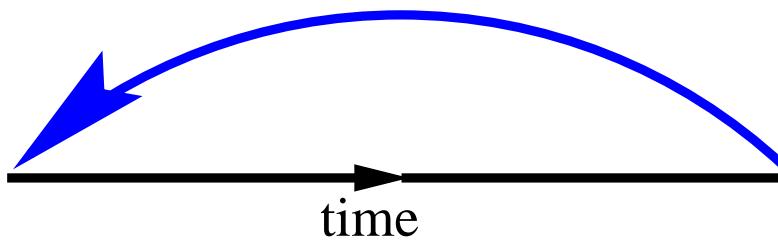
To:

individuals
spatial regions
performance class (e.g. behind schedule)
properties (e.g. own jaguar, have ITS)

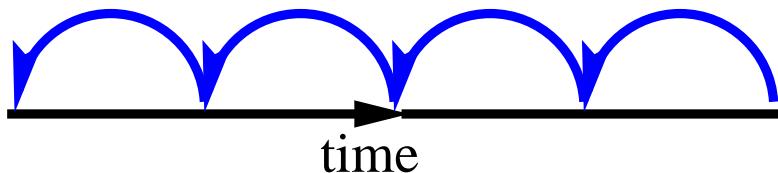
The TRANSIMS user can vary the information used in feedback,
including how it is distributed among travelers.

Example Time Windows

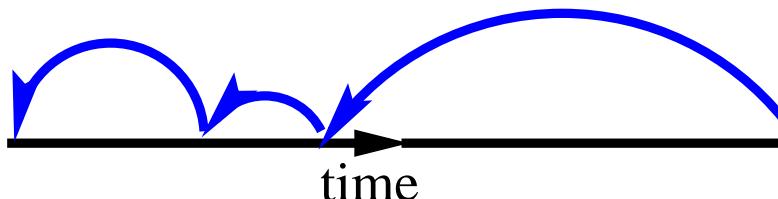
Full Simulation Feedback:



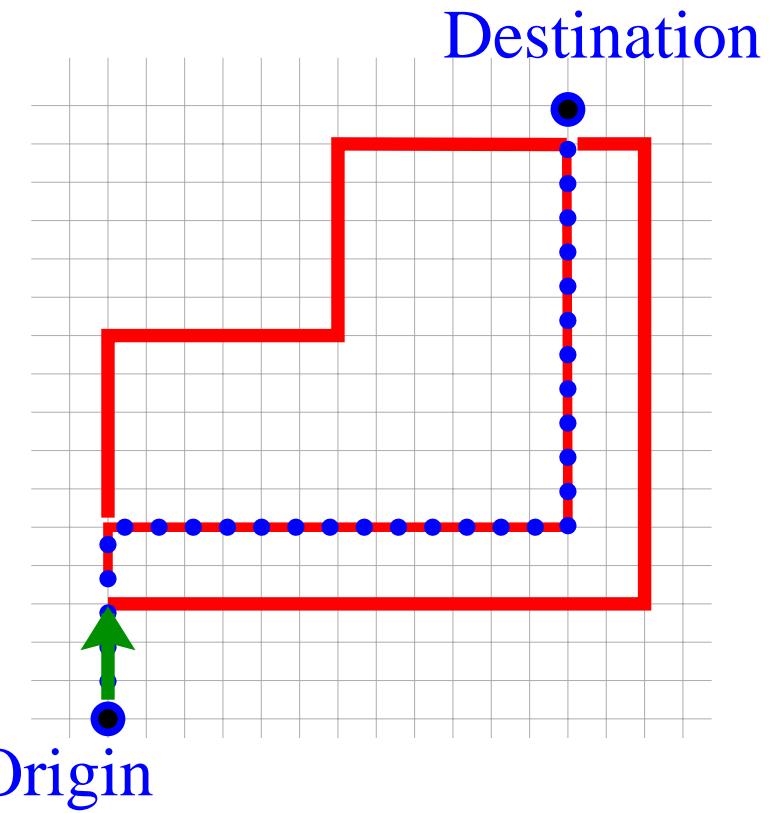
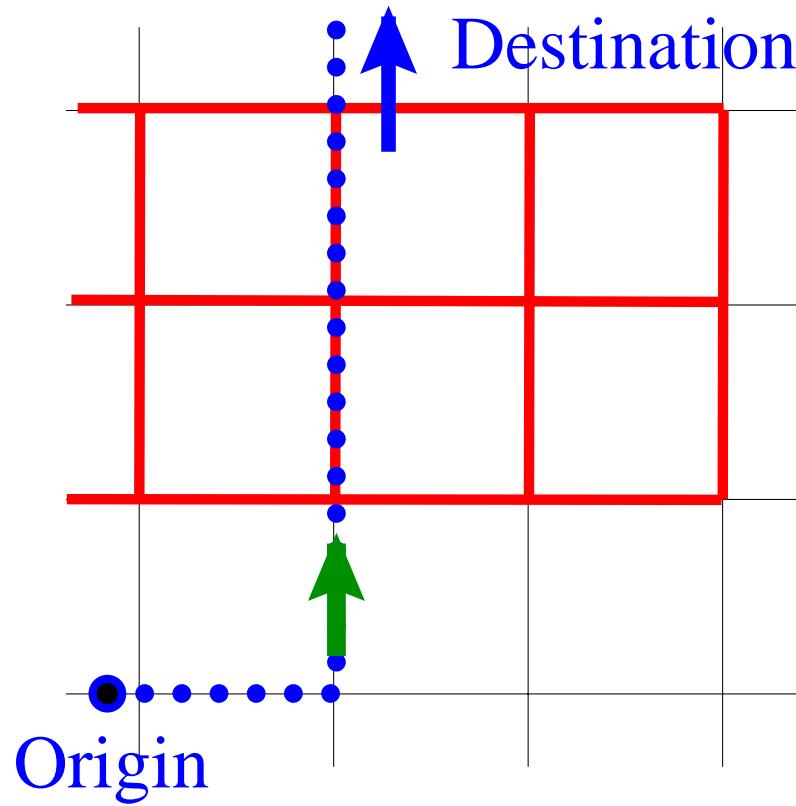
Regular Timestep, Event Trapping:



Event Triggered Feedback:



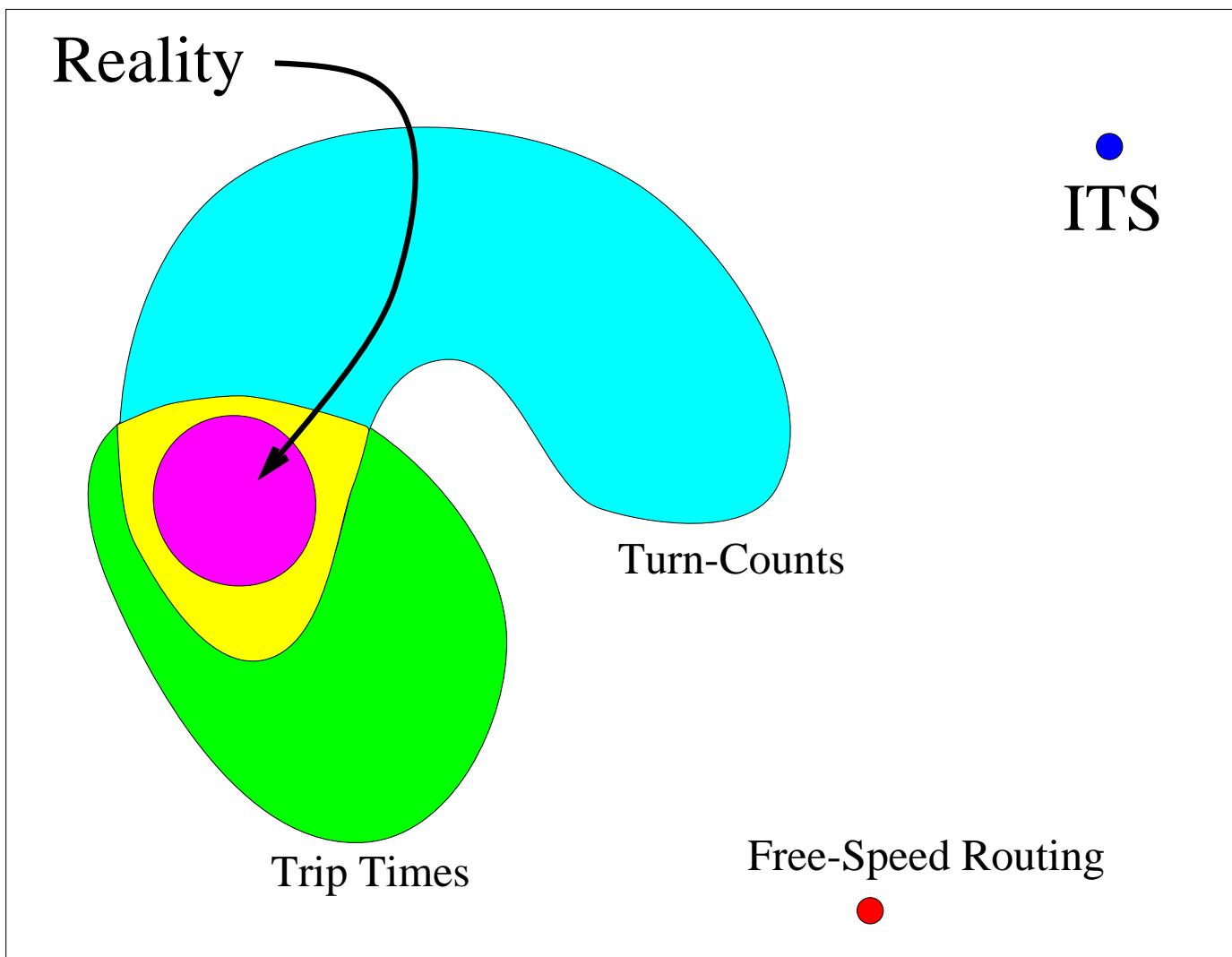
Example “ITS” Information Content in Feedback



Convergence and Modeling

Before (and after) modeling information flow, the system must (can) be converged.

Simulation State-Space



Summary

We have developed methods and tools to provide information movement in transport modeling using TRANSIMS for various purposes.

- Self-consistent modeling (e.g., plan convergence)
- Intelligent Transportation Systems (ITS)
- General inverse finding (e.g. Nash equilibrium)
- Data-limited situations

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